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NOTES:

Inventor: Kazunari Motohashi
Serial No.: 10/ 613,371
Art Unit: 1773
Filed: July 3, 2003
Attorney Ref.: 075834.00409

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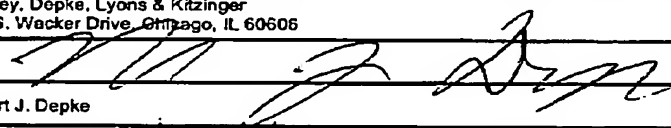
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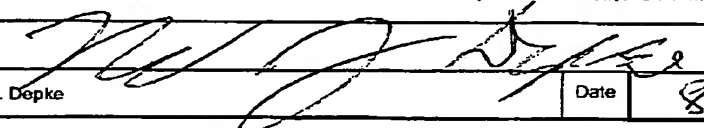
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TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	10/ 613,371
	Filing Date	July 3, 2003
	First Named Inventor	Kazunari Motchashi
	Art Unit	1773
	Examiner Name	Kevin M. Bernatz
Total Number of Pages in This Submission	Attorney Docket Number	075834.C04C9

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Firm Name	Rockey, Depke, Lyons & Kitzinger 233 S. Wacker Drive, Chicago, IL 60606	
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Printed name	Robert J. Depke	
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Effective 10/01/2004. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$ 1,000.00

Complete if Known

Application Number 10/ 613.371
 Filing Date July 3, 2003
 First Named Inventor Kazunari Motohashi
 Examiner Name Kevin M. Bernatz
 Art Unit 1773
 Attorney Docket No. 075834.00409

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1. BASIC FILING FEE

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1001 790	2001 395	Utility filing fee	
1002 350	2002 175	Design filing fee	
1003 550	2003 275	Plant filing fee	
1004 790	2004 395	Reissue filing fee	
1005 150	2005 80	Provisional filing fee	
SUBTOTAL (1)			(\$ 0.00

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Extra Claims Fee from below Fee Paid

Total Claims -20** = X =

Independent Claims -3** = X =

Multiple Dependent =

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
1202 18	2202 9	Claims in excess of 20	
1201 88	2201 44	Independent claims in excess of 3	
1203 300	2203 150	Multiple dependent claim, if not paid	
1204 88	2204 44	** Reissue independent claims over original patent	
1205 18	2205 9	** Reissue claims in excess of 20 and over original patent	
SUBTOTAL (2)			(\$ 0.00

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FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Small Entity

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1051 130	2051 65	Surcharge - late filing fee or oath	
1052 50	2052 25	Surcharge - late provisional filing fee or cover sheet	
1053 130	2053 130	Non-English specification	
1812 2,520	1812 2,520	For filing a request for ex parte reexamination	
1804 920*	1804 920*	Requesting publication of SIR prior to Examiner action	
1805 1,840*	1805 1,840*	Requesting publication of SIR after Examiner action	
1251 110	2251 55	Extension for reply within first month	
1252 430	2252 215	Extension for reply within second month	
1253 980	2253 490	Extension for reply within third month	
1254 1,530	2254 765	Extension for reply within fourth month	
1255 2,080	2255 1,040	Extension for reply within fifth month	
1401 340	2401 170	Notice of Appeal	\$500.00
1402 340	2402 170	Filing a brief in support of an appeal	\$500.00
1403 300	2403 150	Request for oral hearing	
1451 1,510	1451 1,510	Petition to institute a public use proceeding	
1452 110	2452 55	Petition to revive - unavoidable	
1453 1,330	2453 665	Petition to revive - unintentional	
1501 1,370	2501 685	Utility issue fee (or reissue)	
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1503 660	2503 330	Plant issue fee	
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1808 180	1808 180	Submission of Information Disclosure Stmt	
8021 40	8021 40	Recording each patent assignment per property (times number of properties)	
1809 790	2809 395	Filing a submission after final rejection (37 CFR 1.129(a))	
1810 790	2810 395	For each additional invention to be examined (37 CFR 1.129(b))	
1801 790	2801 395	Request for Continued Examination (RCE)	
1802 900	1802 900	Request for expedited examination of a design application	

Other fee (specify)

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SUBTOTAL (3) (\$ 1,000.00

SUBMITTED BY

Name (Print/Type) Robert L. Depke

Registration No. (Attorney/Agent) 37,607

(Complete if applicable)

Telephone 312-277-2600

Signature

Date

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.: 10/613,371 Confirmation No.: 4837
Applicant: Kazunari Motohashi
Filed: July 3, 2003
TC/A.U.: 1773
Examiner: Kevin M. Bernatz
Docket No.: 075834.00409
Customer No.: 33448

APPEAL BRIEF

I. REAL PARTY IN INTEREST

The real party in interest is Sony Corporation as a result of transfer of all right, title and interest to the subject matter of this Application Serial No. 10/613,371, via the Assignment recorded in the Patent Office in Reel 014269 Frame 0058 on July 3, 2003.

II. RELATED APPEALS AND INTERFERENCES

Applicant and the undersigned are unaware of any further related judicial proceedings, appeals, or interferences in relation to the instant Appeal.

III. STATUS OF CLAIMS

The claims currently stand in condition as modified by an Amendment A dated November 16, 2004 amending claim 1, as further modified by Amendment Accompanying RCE dated June 24, 2005 amending claim 1, and finally modified by an Amendment Accompanying B dated March 19, 2006 amending claim 1 and adding new claims 2 and 3.

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Accordingly, claims 1 - 3 are currently rejected and appealed, and stand in condition as set forth in the attached Appendix of Claims on Appeal.

IV. STATUS OF AMENDMENTS

No Amendment After Final affecting the claims has been filed or entered by the Examiner. Accordingly, all remaining claims stand in the same condition as they did at the time of the May 26, 2006 Final Office Action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates to a high-density magnetic recording medium for use in a system using a magnetoresistive effect magnetic head (MR head) or a giant magnetoresistive effect magnetic head (GMR head). The magnetic recording medium of the present invention is extremely advantageous in effectively utilizing high reproduction sensitivity for MR or GMR heads. The present invention is directed to a particular type of magnetic thin films in which a metallic material is deposited through vacuum thin film forming techniques over a non-magnetic substrate material. Such magnetic thin-film tapes have excelled in coercive force and in squareness ratio. (See pages 1 - 2 of the Background of the Invention).

Traditionally, thin-film deposition is accomplished by making an elongated nonmagnetic support run in the longitudinal direction and depositing a magnetic material on a major surface of the nonmagnetic support while the tape runs, thereby forming a magnetic layer. However, when the thickness of the magnetic tape produced by using the oblique evaporation method is reduced from 200nm to under 55nm, the number of magnetic fine

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particles contained in the direction of film thickness becomes very small. As a result, the orientation of the deposited magnetic fine particles begins to seriously affect the magnetic properties of the entire magnetic layer. (See page 4: Summary of the Invention).

As described on pg. 6 of the disclosure and in Fig's 1A, 1B, 2A, and 2B, Applicants have identified a critical range of operation (under 55nm) in which the arranging directions of the dispersed metallic particles no longer follow a continuous distribution (See Fig's 1A and 1B), but rather form several distinct discrete orientations (See Fig's 2A and 2B). Accordingly, Applicants invention is directed to a method of providing an optimal growth orientation of magnetic particles in thin-film magnetic recording mediums for use with magnetoresistive effect and giant magnetoresistive effect heads to reproduce a signal. (See the bottom of page 7 of the disclosure). As a result, electromagnetic conversion properties are enhanced (See page 8 of the disclosure).

In accordance with the foregoing, independent claim 1 is directed to a thin magnetic recording medium having a magnetic recording layer 3 that is 50 nm or less and wherein an angle θ (See Fig. 5) which is a growth direction of magnetic particles in a longitudinal cross-section of said magnetic layer with respect to a line normal to said nonmagnetic support, satisfies the following relation: $\theta_i - \theta_f \leq 25^\circ$ (See Fig. 5 and pg. 15 of the specification), where θ_i is an angle of initial growth for said magnetic layer, and θ_f is an angle of final growth for said magnetic layer, and further wherein a deposition range is restricted such that a maximum incidence angle α_i and minimum incidence angle α_f satisfies the relationship: $\alpha_i - \alpha_f \leq 25^\circ$ (See pg. 15 of the specification).

Also in accordance with the foregoing, dependent claim 2 is directed to a magnetic recording medium according to claim 1, further including an underlying layer 2 comprised of

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binder residents and having an average particle diameter of 5 to 30 nm and wherein the density of surface projections is in a range of from 50×10^4 per millimeter squared to 3000×10^4 per millimeter squared (See pg.'s 10 – 11 of the specification).

Finally, dependent claim 3 is directed to a magnetic recording medium according to claim 1, further wherein the magnetic layer 3 is less than the 50 nm in thickness (See Examples 2 and 3 in Tables 1 and 2, pg.'s 26 and 27 of the specification).

VI. GROUND S OF REJECTION TO BE REVIEWED ON APPEAL

- A. Whether the teachings of the *Ishida et al.* (U.S. Patent No. 5,554,440) reference provide the requisite disclosure in order to render anticipated obvious claims 1 and 3 under 35 U.S.C. §102(b).
- B. Whether the teachings of the *Ishida et al.* (U.S. Patent No. 5,554,440), and *Tsunekawa et al.* (U.S. Patent No. 7,026,064) references provide the requisite disclosure in order to render obvious claim 2 under 35 U.S.C. §103(a).

VII. ARGUMENT

Applicant respectfully submits that the prior art references of record, whether considered alone, or in combination, fail to teach or suggest Applicant's presently claimed invention. As detailed below, the rejections set forth by the Examiner are improper.

A. The Cited References Fail to Render Anticipated the Claimed Invention as specified in Claim 1.

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Applicant respectfully requests reconsideration of the Examiner's rejection of claim 1 under 35 U.S.C. §102(b). The Examiner has rejected this claim in view of the cited prior art reference of *Ishida et al.* (U.S. Patent No. 5,554,440).

Claim 1 currently contains the following limitations, numerically numbered for ease of reference:

- 1) A magnetic recording medium having a magnetic layer with a thickness 50 nm or less formed over a surface of an elongated nonmagnetic support by a vacuum thin film forming technique,
- 2) wherein an angle θ which is a growth direction of magnetic particles in a longitudinal cross-section of said magnetic layer with respect to a line normal to said nonmagnetic support, satisfies the following relation:

$$\theta_i - \theta_f \leq 25^\circ$$

where θ_i is an angle of initial growth for said magnetic layer, and θ_f is an angle of final growth for said magnetic layer, and

- 3) and further wherein a deposition range is restricted such that a maximum incidence angle α_i and minimum incidence angle α_f satisfies the relationship:

$$\alpha_i - \alpha_f \leq 25^\circ.$$

Applicant notes that the main contentions remaining between Applicant and the Examiner is the extent to which the prior art anticipates the claim element (1) regarding the

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thickness of the magnetic layer and the claim element (2) regarding the growth orientation of the deposited magnetic particles.

In regard to the first claim limitation, *Ishida* fails to anticipate Applicants claimed magnetic layer at a thickness of 50nm or less. (See Table 1 on page 26 of Applicants disclosure). Specifically, see column 14 at lines 57-60 of the *Ishida* reference, which states that the magnetic layer should preferably be grown at a thickness of "from 50nm to 150 nm." From this statement alone, it is not clear whether the endpoints, 50nm or 150nm, are included in the range. However, when read in light of Column 14, lines 42 – 55, it is clear that the reference discloses that the 50nm mark is not included, while the 150nm mark is. More specifically, the reference teaches that "When the thickness of the magnetic layer exceeded 50nm, the output tended to saturate while the noise increased, so that the C/N tended to decreased [sic] in the thickness range of 150nm or larger...But, when the thickness of the magnetic layer exceeded 150nm, the overwriting property slightly deteriorated with the increase of the thickness of the magnetic layer." In light of the use of the term "exceed," and in light of Fig. 21 which shows the C/N ratio decreasing rapidly and significantly under at 50nm and below, Applicants submit that one of ordinary skill in the art would interpret the stated range of operation to be 50nm (exclusive) to 150nm (inclusive). Such a range fails to anticipate Applicant's currently claimed invention.

In contrast to the above references, Applicant has identified the criticality of the range of magnetic particle growth angles that maximize the electromagnetic conversion characteristic (CNR) for a thin magnetic tape which is 50nm or less. See, for example, Figure 6 of Applicants disclosure which compares the much narrower critical range required of such a device compared to the thicker range disclosed in *Ishida*.

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Neither reference cited, alone or in combination, teaches or suggests such a range in a thin film magnetic tape, or the criticality of such a range as shown in Figures 1A – 2B, in regard to the discontinuities created in the orientations of the dispersed magnetic particles.

Regarding the second claim element directed to the growth orientation of dispersed magnetic particles, Applicants submit that the prior art of record fails to teach or suggest anything regarding the actual growth orientation of the dispersed magnetic particles. Furthermore, Applicants submit that, counter to the Examiner's assertion; the growth direction of the dispersed crystals is not directly proportional to the incidence angle of deposition. For example, see the Comparative Examples 1 in Table 1 on page 26 of the disclosure, which shows that an initial incidence angle of 70° results in a growth orientation of 54°, and a final incidence angle of 40° results in a growth orientation of 27°. Significantly, when comparing this to Comparative Example 2 in Table 1, an increase in the initial incidence angle by 5° (to 75°) results in an increase of the growth orientation by 9° (to 63°). Furthermore, an increase in the final incidence angle by 5° (to 45°) results in an increase of the growth orientation by only 2° (to 29°). Accordingly, Applicants submit that the Examiner's prima facie assertion of anticipation cannot stand, as it is clear that the growth direction of the dispersed magnetic crystals is not directly proportional to the incidence angle.

For all the reasons set forth above, Applicants submit that the Examiner's rejection of claim 1 under 35 U.S.C. §102 must be withdrawn, and claim 1 placed into condition for allowance.

B. The Cited References Fail to Render Anticipated the Claimed Invention as specified in Claim 3.

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Applicant respectfully requests reconsideration of the Examiner's rejection of claim 3 under 35 U.S.C. §102(b) and alternatively under §103(a). The Examiner has rejected this claim in view of the cited prior art reference of *Ishida et al.* (U.S. Patent No. 5,554,440).

Dependent claim 3 currently contains the following additional limitations over that of independent claim 1:

“further wherein the magnetic layer is less than the 50 nm in thickness.”

Applicant notes that the main contention remaining between Applicant and the Examiner is the extent to which the prior art anticipates the claim element regarding the thickness of the magnetic layer.

As noted in the previous section in regard to claim 1, *Ishida* fails to anticipate Applicant's claimed magnetic layer at a thickness of less than 50nm. (See Table 1 on page 26 of Applicants disclosure). Specifically, see column 14 at lines 57-60 of the *Ishida* reference, which states that the magnetic layer is should preferably be grown at a thickness of “from 50nm to 150 nm.” From this statement, it is not clear whether the endpoints, 50nm or 150nm, are included in the range. However, when read in light of Column 14, lines 42 – 55, it is clear that the reference discloses that the 50nm mark is not included, while the 150nm mark is. More specifically, the reference teaches that “When the thickness of the magnetic layer exceeded 50nm, the output tended to saturate while the noise increased, so that the C/N tended to decreased [sic] in the thickness range of 150nm or larger...But, when the thickness of the magnetic layer exceeded 150nm, the overwriting property slightly deteriorated with the increase of the thickness of the magnetic layer.” In light of the use of the term “exceed,” Applicants submit that one of ordinary skill in the art would interpret the stated range of

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operation to be 50nm (exclusive) to 150nm (inclusive). Such a range fails to anticipate Applicant's currently claimed invention.

Additionally, in regard to the Examiner's obviousness assertion, Applicants submit that the *Ishida* reference clearly teaches away from the further limitation of claim 3. For example, in Column 14, line 58, stating that the thickness of the magnetic layer is "preferably 50nm to 150nm." Furthermore, see Fig. 21 of *Ishida*, which shows the C/N ratio decreasing rapidly and significantly under at 50nm and below. In light of Federal Circuit caselaw that states that "it is improper to combine references where the references teach away from their combination," Applicants submit that the rejection of claim 3 must be withdrawn, and claim 3 placed into condition for allowance. (See *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983)).

C. The Cited References Fail to Render Anticipated the Claimed Invention as specified in Claim 2.

Applicant respectfully requests reconsideration of the Examiner's rejection of claim 2 under 35 U.S.C. §103(a). Examiner has rejected these claims in view of the cited prior art references of *Ishida et al.* (U.S. Patent No. 5,554,440) and *Tsunekawa et al.* (U.S. Patent No. 7,026,064).

Under Section 2143 of the MPEP, in order to establish a prima facie case of obviousness, the Examiner must meet three basic criteria. "First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art

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reference (or references when combined) must teach or suggest all the claim limitations.”
MPEP §2143 rev. 3 (August, 2005).

Applicant asserts that the Examiner has failed to establish a prima facie case of obviousness for at least the reason that the prior art reference fails to teach or suggest **all** of the claim limitations.

Claim 3 adds the further limitations of (corrected for clarity on appeal, corrections noted in parentheses):

an underlying layer comprised of binder resins (residents) and
having an average particle diameter of 5 to 30 nm and wherein the (he)
density of surface projections is in a range of from 50×10^4 per millimeter
squared to 3000×10^4 per millimeter squared.

In regard to at least the limitation regarding the density of surface projections, Applicants submit that the cited portion of the *Tsunekawa* reference does not support the Examiner’s assertion of prior art anticipation. More specifically, the portion of the *Tsunekawa* reference to which the Examiner cites (Column 7, lines 3 – 21) merely discloses the density distribution of protrusions between 3nm and 5nm (See specifically, line 7). The reference fails to disclose the overall density for all protrusions, as currently claimed.

At least for the reasons cited above, Applicants submit that the cited references fail to teach or suggest **all** of the limitations of the claimed invention. As noted in earlier sections, the Ishida reference fails to teach or suggest the limitations of the base claim. In addition, Applicants submit that the *Tsunekawa* reference fails to teach or suggest the additional limitations set forth in the dependent claim 3. Accordingly, Applicant submits that claim 3 is

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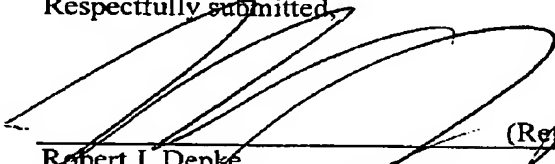
allowable over the cited prior art, and respectfully request that the rejection be over-turned on appeal and the remaining claim placed in condition for allowance.

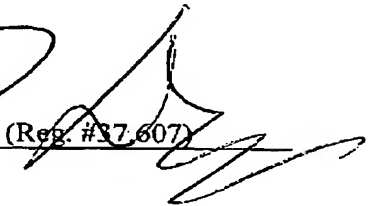
CONCLUSION

In light of the foregoing, Applicant submits that the rejections of all claims are improper for the reasons noted and the rejections should all therefore be withdrawn.

Respectfully submitted,

Date: August 28, 2006


Robert J. Depke
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(Reg. #37,607)

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CLAIMS APPENDIX:

This listing of claims reflects the current status of the claims as they stand in light of the May 26, 2006 Final Office Action:

1. (Rejected) A magnetic recording medium having a magnetic layer with a thickness 50 nm or less formed over a surface of an elongated nonmagnetic support by a vacuum thin film forming technique,

wherein an angle θ which is a growth direction of magnetic particles in a longitudinal cross-section of said magnetic layer with respect to a line normal to said nonmagnetic support, satisfies the following relation:

$$\theta_i - \theta_f \leq 25^\circ$$

where θ_i is an angle of initial growth for said magnetic layer, and θ_f is an angle of final growth for said magnetic layer, and

and further wherein a deposition range is restricted such that a maximum incidence angle α_i and minimum incidence angle α_f satisfies the relationship:

$$\alpha_i - \alpha_f \leq 25^\circ.$$

2. (Rejected) The magnetic recording medium according to claim 1, further including an underlying layer comprised of binder residents and having an average particle diameter of 5 to 30 nm and wherein the density of surface projections is in a range of from 50×10^4 per millimeter squared to 3000×10^4 per millimeter squared.

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3. (Rejected) The magnetic recording medium according to claim 1, further wherein the magnetic layer is less than the 50 nm in thickness.

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IX. EVIDENCE APPENDIX:

None.

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X. RELATED PROCEEDINGS APPENDIX:

None.